DOCUMENT RESUME

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ABSTRACT

A project was conducted to establish criteria for entry- and exit-level competencies in computer technology along with concomitant entry-level job positions and to recommend a modified, updated computer technology curriculum. Information was gathered through employer interviews, discussions with educators, and examinations of exemplary programs and college and university programs. Analysis of the information gathered resulted in documentation of computer jobs that exist today, the competencies required for entry into these jobs, classes leading to these competencies, classes grouped into a curriculum leading to these jobs, and information on how to obtain these jobs. The study concluded that students would need knowledge of a variety of computer software, excellent English skills, good mathematics skills at least through algebra, social skills, and a teamwork approach in order to work in the computer science field. A required core of classes and their competencies was developed. (KC)

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Project for Tech Prep Curricula in Computer Science Technology

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NORTHWEST COLLEGE 33170001
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HOUSTON COMMUNITY
COLLEGE SYSTEM

MEMORANDUM

DATE: August 17, 1993

TO: Gulf Coast Colleges & Universities

FROM: Northwest College/H.C.C.S.
Tech Prep Contact (Office)

RE: Computer Technology Research Study

Enclosed are the results of an exhaustive study compiled in conjunction with a Tech Prep Grant to Northwest College H.C.C.S. This study, according to D.O.E. and the Tech Prep initiative, was a first of its kind. It established criteria for entry and exit level competencies in computer technology along with concomitant entry level job positions. This data then was utilized to recommend a modified, updated computer technology criteria. A significant part of the study also focused on work experience in the field (cooperative education).

If you have any questions or comments, kindly address them to:

Northwest College
Business Careers and Computer Technology
5514 Clara
Houston, TX 77041

Thank you.

16360 Park 10 Place Drive, P.O. Box 7849, Houston, TX 77270-7849 • (713) 578-3487

Contents

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7.	Tech Prep Minutes for Advisory Committee Members	Inputs from the Advisory Committee and Other Employers
8.	Skills for the Jobs	Skills vs Jobs Matrix
9.	Implementation Plan	Suggestions for Implementing the New Curriculum

Computer Jobs

And

The Curriculum

That Leads To Them

A Tech Prep Study

Houston Community College
Northwest Campus

and

Spring Branch ISD

Inputs

- ★ Detailed one on one employer interviews
- ★ Houston Community College Educators
- ★ Spring Branch High School Educators
- ★ Testing Experts
- ★ Advisory Committee Meetings
- ★ Employment Agencies
- ★ Texas Employment Commission
- ★ TechForce 2000

Inputs
(continued)

- ★ Exemplary Tech Prep Programs
- ★ Houston Area 2 Year Colleges and Universities

Outputs

- ★ Computer Jobs that Exist Today
- ★ Competencies Required
- ★ Classes Leading to these Competencies
- ★ Classes Grouped into Curriculum leading to these Jobs
- ★ How to Go into the Market Place and Get these Jobs

Jobs

★ Problem Solvers

★ Generalists with a Specialty

★ Wide Ranging

- ☞ Programmer/Analyst
- ☞ Operator
  Hardware Technician
- ☞ Help Desk/Trouble Shooter
  P.C. Coordinator
- ☞ Network Administrator/
  System Administrator
- ☞ Technical Writer
- ☞ Trainer

Balanced Curriculum

- ★ Communications
- ★ Academic Fundamentals
- ★ General Computing
- ★ Computer Based Specialty
- ★ General Business/Accounting
- ★ Business Based Specialty
- ★ Understanding What An Employer Expects

Information From Employer Interviews

- ★ Opportunities for Spring Branch H.S. and H.C.C.S. Graduates
- ★ Cooperative Opportunities
- ★ Hardware and Software Used Today
- ★ Hardware and Software Expected to be Used in the Future
- ★ Technical and Nontechnical Competencies Required for Entry Level Jobs
- ★ Salary Information

Leading Edge Work

- ★ Other Local Educational Institutions Have Not Done What We've Done
- ★ Other National Programs Have Not Done What We've Done
- ★ TechForce 2000 Does Not Have the Detailed Competencies We Have

Changing Field of Computers

- ★ New and Existing Technologies Must be Continually Monitored for Relevance in the Work Place
- ★ Windows Penetration
- ★ CASE (Computed Aided Software Engineering)
- ★ Object Oriented
- ★ Expert Systems
- ★ Balance Today's Investment vs Tomorrow's Productivity

Trends

★ Corporate Downsizing

★ Needs:

- ☞ Productivity
- ☞ Flexibility
- ☞ Knowledge of the Specific Business
- ☞ Strong Basic Skills (English and Math)
- ☞ Oral and Written Communication
- ☞ Knowledge of Today's Office and Teamwork

Trends
(continued)

★ Technical Knowledge is Only 25-50% of What's Needed

Next Steps

- ★ Increasing the Number of Business Partners
- ★ Adding to the Class Descriptions
- ★ Sharing Information with Others
- ★ Certification Agreements with Major Vendors
  - ☞ Novell
  - ☞ Oracle
  - ☞ Progress
  - ☞ Powerbuilder

Need for Success

- ★ Detailed Syllabi
- ★ Appropriate Faculty
- ★ Student Recruiting
- ★ Flexible "Coop" Program
- ★ Continuous:
  - ☞ Cultivation of Employers
  - ☞ Updating of the Curriculum

Sources for Employer Information for Computer Careers

Acufleet

Analysts International

BMC Software

Brown & Root

Cadysys

Compaq

ECOM Personnel

Exxon Energy Chemicals

Halliburton Geophysical

Henley International

Houston Lighting & Power

M. David Lowe

Major Financial Security Dealer

Major Hospital

Major Oil Co.

Major Hospital and other Business Units Holding Company

McGinnis Cadillac

Norton Computing

OBER-TECH

Production Operators

Shell

Texas Commerce Bank

Texas Employment Commission

Union Texas Petroleum

VALIC (An American General Company)

Computer Jobs

All the computer jobs require a broad base of knowledge so that the student will be able to solve a variety of problems. All curriculums will be a mixture of technical subjects and nontechnical subjects. Both the technical and nontechnical subjects (eg. proposal writing, verbal presentations, team work, time management and topics specific to the type of industry to be supported) were recommended by Advisory Board Members who are currently working in industry in the Computer field.

Programmer/Analyst - in addition to the traditional activities associated with this position (eg. design, program, test and document system); today's programmer analyst needs additional skills. These skills include writing proposals for applications systems, understanding the business that is being automated and recommending various hardware and software. Should be prepared to help end users.

Hardware Technician - this position is primarily in the p.c. area but it may extend to work stations and minicomputers. The job requires that the technician be able to determine where the problem is: hardware, software, telecommunications, or user error (incorrect use of the system). If it is a hardware error then the technician follows through with the necessary repair; otherwise the technician can either solve the problem himself or herself or the technician brings in someone who can solve the problem.

Help Desk/Trouble Shooter - this position handles a wide variety of end user problems, typically they are received either over the phone or via electronic mail. The first choice is to solve the problem over the phone or via electronic mail, the second choice is to go to the end user's location to solve the problem, and the final option is to bring in appropriate expertise to solve any problems beyond the **trouble shooter's** expertise. Most problems will be in the area of p.c. hardware, software or LAN related.

Trainers - most of the training will be to teach end users how to use p.c. software. The software may be purchased or it may be developed in house. The trainer writes class material.

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Operators - in addition to the traditional activities associated with this position (following a production schedule, setting up and submitting production jobs, taking jobs off the printers, and controlling the priorities when a job is being executed or on the print queue; today's operator needs additional skills on the hardware platform he or she is responsible. These platforms are increasingly minicomputers (AS/400 or Digital Equipment) and/or LANS. Skills include being able to configure these systems, and add new users and devices (printers, terminals, storage).

Technical Writers - this position prepares easy to understand documents so that end users can use application systems and mass marketed software, and documents the internals of complex software so one set of computer professionals can understand what another set of computer professionals has created. To perform these tasks the **technical writer** needs to understand the software that he or she is writing about. Of course, top flight English writing skills are required.

P.C. Coordinator - this position is responsible for meeting the current p.c. needs of the end user community and planning for its future p.c. needs. This person needs to be knowledgeable about system software, industry specific software for the industry he or she is working in, and various hardware configurations. This position requires good interpersonal and verbal skills due to the heavy interface with end users, and good writing skills for proposal writing. This position may also be responsible for product review for hardware & software, maintenance, and end user training. Sometimes this position would also be responsible for the **Help Desk/Trouble Shooter's** duties.

Network Administrator - this position is responsible for planning, installing, configuring, optimizing performance, securing, trouble shooting, and training people on the network. This person must also be prepared to recommend specific topologies, protocols, network software, and network hardware. The **Network Administrator** is also responsible for: Communication between locations, Voice and Data issues, Server Administrator problems, Installation & Maintenance of Shrink Wrapped Applications.

System Administrator - this position is responsible for planning, installing, configuring, tuning for peak efficiency, security issues, hardware & software decisions, negotiating contracts. The System Administrator works with the PC as well as the minicomputer platforms.

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Required and Elective Classes

There is a required core of classes for all Computer majors. The 9 Computer Job are then grouped into 5 curriculums. The 5 curriculums each have additional core classes and electives.

The class list briefly describes each of the classes in the curriculum. Academic class begin with an "A" and computer classes begin with a "C." If there is a potential H.C.C.S. class that covers the subject, its course code follows the "A" or "C" number.

The number of credit hours and the amount of class time and lab time each semester follow the course name.

REQUIRED CLASSES FOR ALL TECH PREP STUDENTS

Required Core		credit	lecture	lab	semester
• A1 ENGL 1301	Composition I	3	(3)		1
• A2 ENGL 1302	Composition II	3	(3)		2
• A3 MATH 1314	College Algebra	3	(3)		1
or, if placed out of College Algebra					
• A3-1 MATH 1342	Statistics	3	( )		1
A4	Business Ethics & Philosophy	3	( )		
• A5 BUSM 2311	Principles of Mgmt.	3	( )		
• A6-1 ACCT 2301	Principles of Accounting I				

• = transferable to a four year college

Computer classes Core:

C1	Intro. to Computers: MS-DOS	3	(2,2)		1
C3	Windows I: Microsoft Office	3	(2,2)		

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HARDWARE TECHNICIAN / OPERATOR / SYSTEM ADMINISTRATOR

			credit	lecture	lab
	Required Core				
					semester
	Major Area Core				
	C4 CSCI 1360	Data Communications & Networks	3	(2,2)	
	C5	Testing: Systems	1	(,1)	
	C10	Troubleshooting: (Hardware & Software)	3	(3,2)	
	C16	Unix I: Application Development	3	(3,2)	
*	C24-1	Operations: AS400	3	(3,2)	
	C24-2	Operations: DEC	3	(3,2)	
	C25	Windows Troubleshooting	2	(1,2)	

* One of this group - mandatory: Hardware Technician
  Two out of three - mandatory: Operator/System Admin.

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21-24 Approved Electives

Optional Computer Classes

C6	Microfocus COBOL	3	(3,2)
C9	Oracle I	3	(3,2)
C13	Windows Programming	3	(3,2)
C14	Co-op **(mandatory if possible)**	4	(1,20)
C15	Visual Basic/ Power Builder	4	(3,3)
C17	LAN Administration	3	(3,2)
C24-1	Operations: AS400	3	(3,2)
C24-2	Operations: DEC	3	(3,2)
C25	Windows Troubleshooting	2	(1,2)
C26	Imaging / EDI concepts	3	(3,)
C27	'C' Programming II	3	(3,2)
C28	Oracle II	3	(3,2)
C29	Unix II	3	(3,2)
C30	Windows NT	3	(3,1½)
C31	Novell Network Administrator Certification	4	(2,4)

Optional Academic Classes

A6	Business: Special.	3
A6-0 ACCT 1301	Office Accounting I	
• A6-2 ACCT 2302	Principles of Accounting II	
• A6-8 ACCT 2311	Oil & Gas Accounting	

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•	A6-13 BUSM 2320	Personnel Management
•	A6-18 SPCH 1315	Public Speaking
	A7	Business: Analytical Skills 1 (1,)

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HELP DESK / PC COORDINATOR / TRAINER

			credit	lecture	lab
Required Core					
					semester
*	**A6**	**Business Specialty**	**3**		
	• A6-2 ACCT 2302	Principles of Accounting II			
	• A6-8 ACCT 2311	Oil & Gas Accounting			
	• A6-13 BUSM 2320	Personnel Management			
	• A6-18 SPCH 1315	Public Speaking			

• Transferable: Must take 15 Credits

*** A6-1 and one additional class from group A6 are mandatory - see class list for more A6 options**

Major Area Core

	C4 CSCI 1360	Data Communications & Networks	3	(2,2)
	C5	Testing: Systems	1	(,1)
	C10	Troubleshooting: (Hardware & Software)	3	(3,2)
**	C13	Windows Programming	3	(3,2)
**	C25	Windows Troubleshooting	2	(1,2)

** = Not mandatory for TRAINER

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Optional Classes 21 Approved Electives:
27 Approved Electives: Trainer

C6	Microfocus COBOL	3	(3,2)
C9	Oracle I	3	(3,2)
C14	Co-op **(mandatory if possible)**	4	(1,20)
C15	Visual Basic/ Power Builder	4	(3,3)
C16	Unix I: Application Development	3	(3,2)
C17	LAN Administration	3	(3,2)
C18-1 TECC 1345	Desktop Publishing: Introduction (IBM)	3	(3,1⅓)
C18-2 TECC 1344	Desktop Publishing: Introduction (IBM)	3	(3,1⅓)
C19-1 TECC 2347	Desktop Publishing: Intermediate (Macintosh)	3	(3,1⅓)
C19-2 TECC 2356	Desktop Publishing: Intermediate (IBM/PageMaker)	3	(3,1⅓)
C19-3 TECC 2357	Desktop Publishing: Intermediate (IBM/Ventura)	3	(3,1⅓)
C20	Testing: Documents	1	(,1)
C23	LAN II: Hardware/Communications Support	3	(3,2)
C25	Windows Troubleshooting	2	(1,2)
C26	Imaging / EDI concepts	3	(3,)
C27	'C' Programming II	3	(3,2)
C28	Oracle II	3	(3,2)
C29	Unix II	3	(3,2)

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C30		Windows NT	3 (3,1½)
C31		Novell: Network Administrator Certification	4 (2,4)
C32		Novell: CNE Certification	4 (3,3)
C33-1	TECC 2355	Text Processing for Desktop Publishing (IBM)	3 (3,1½)
C33-2	TECC 2345	Text Processing for Desktop Publishing (Mac)	3 (3,1½)
C34	TECC 2441,2322,2343	Technical Writing on Microcomputer (IBM)	3 (3,2)
C35-1	TECC 2349	Desktop Publishing: Advanced (Mac)	3 (3,1½)
C35-2	TECC 2359	Desktop Publishing: Advanced (IBM)	3 (3,1½)
C35-3	TECC 2360	Desktop Publishing: Advanced Graphics (Macintosh)	3 (3,1½)

NETWORK ADMINISTRATOR

Required Core	credit	lecture	lab
			semester
* A6 **Business Specialty**	3		
• A6-2 ACCT 2302 Principles of Accounting II			
• A6-8 ACCT 2311 Oil & Gas Accounting			
• A6-13 BUSM 2320 Personnel Management			
• A6-18 SPCH 1315 Public Speaking			

• Transferable: Must take 15 Credits

*** A6-1 and one additional class from group A6 are mandatory - see class list for more A6 options**

Major Area Core

C4 CSCI 1360	Data Communications & Networks	3	(2,2)
C5	Testing: Systems	1	(,1)
C10	Troubleshooting: (Hardware & Software)	3	(3,2)
C13	Windows Programming	3	(3,2)
C17	LAN Administration	3	(3,2)
C25	Windows Troubleshooting	2	(1,2)
C30	Windows NT	3	(3,1½)

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15 Approved Electives

Optional Computer Classes

C6	Microfocus COBOL	3	(3,2)
C9	Oracle I	3	(3,2)
C14	Co-op (mandatory if possible)	4	(1,20)
C15	Visual Basic/ Power Builder	4	(3,3)
C16	Unix I: Application Development	3	(3,2)
C18	Desktop Publishing	3	(3,1½)
C21	Graphics:	1	(,1)
C24-1	Operations: AS400	3	(3,2)
C24-2	Operations: DEC	3	(3,2)
C25	Windows Troubleshooting	2	(1,2)
C26	Imaging / EDI concepts	3	(3,)
C27	'C' Programming II	3	(3,2)
C28	Oracle II	3	(3,2)
C29	Unix II	3	(3,2)
C31	Novell Network Administrator Certification	4	(2,4)
C32	Novell CNE Certification	4	(3,3)

Optional Academic Classes

A7	Business: Analytical Skills	1	(1,)

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PROGRAMMER ANALYST

Required Core		credit	lecture	lab
				semester
*	A6	Business Specialty	3	
•	A6-2 ACCT 2302	Principles of Accounting II		
•	A6-8 ACCT 2311	Oil & Gas Accounting		
•	A6-13 BUSM 2320	Personnel Management		
•	A6-18 SPCH 1315	Public Speaking		

• Transferable: Must take 15 Credits

*** A6-1 and one additional class from group A6 are mandatory - see class list for more A6 options**

Major Area Core

C2	'C' Programming I	4	(3,3)
C4 CSCI 1360	Data Communications & Networks	3	(2,2)
C5	Testing: Systems	1	(,1)
C6	Microfocus Cobol	3	(3,2)
C7	Requirements, Analysis & Design	3	(3,)
C8	'C++' Programming	4	(3,3)
C10	Troubleshooting: (Hardware & Software)	3	(3,2)

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	C11	Application Dev. : AS400	3 (3,2)
or			
	C12	Application Dev. : DEC	3 (3,2)
	C13	Windows Programming	3 (3,2)

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6 Approved Electives

Optional Computer Classes

C9	'Oracle' I	3 (3,2)
C14	Co-op (mandatory if possible)	4 (1,20)
C15	Visual Basic/ Power Builder	4 (3,3)
C16	Unix I: Application Development	3 (3,2)
C17	LAN Administration	3 (3,2)
C18-1 TECC 1345	Desktop Publishing: Introduction (IBM)	3 (3,1½)
C18-2 TECC 1344	Desktop Publishing: Introduction (IBM)	3 (3,1½)
C19-1 TECC 2347	Desktop Publishing: Intermediate (Macintosh)	3 (3,1½)
C19-2 TECC 2356	Desktop Publishing: Intermediate (IBM/PageMaker)	3 (3,1½)
C19-3 TECC 2357	Desktop Publishing: Intermediate (IBM/Ventura)	3 (3,1½)
C20	Testing: Documents	1 (,1)
C23	LAN II: Hardware/Communications Support	3 (3,2)
C24-1	Operations: AS400	3 (3,2)
C24-2	Operations: DEC	3 (3,2)
C25	Windows Troubleshooting	2 (1,2)
C26	Imaging / EDI concepts	3 (3,)
C27	'C' Programming II	3 (3,2)
C28	Oracle II	3 (3,2)

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C29	Unix II	3	(3,2)
C30	Windows NT	3	(3,1½)
C31	Novell Network Administration Certification	3	(3,2)
C32	Novell CNE Certification	4	(3,3)
C33-1 TECC 2355	Text Processing for Desxktop Publishing (IBM)	3	(3,1½)
C33-2 TECC 2345	Text Processing for Desktop Publishing (Mac)	3	(3,1½)
C34 TECC 2441,2322,2343	Technical Writing on Microcomputer (IBM)	3	(3,2)
C35-1 TECC 2349	Desktop Publishing: Advanced (Mac)	3	(3,1½)
C35-2 TECC 2359	Desktop Publishing: Advanced (IBM)	3	(3,1½)
C35-3 TECC 2360	Desktop Publishing: Advanced Graphics (Macintosh)	3	(3,1½)

Optional Academic Classes

A7	Business: Analytical Skills	1	(1,)

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TECHNICAL WRITER

	Required Core		credit	lecture	lab
					semester
*	A6	Business Specialty	3		
	• A6-2 ACCT 2302	Principles of Accounting II			
	• A6-8 ACCT 2311	Oil & Gas Accounting			
	• A6-13 BUSM 2320	Personnel Management			
	• A6-18 SPCH 1315	Public Speaking			

• Transferable: Must take 15 Credits

*** A6-1 and one additional class from group A6 are mandatory - see class list for more A6 options**

Major Area Core

**	C18-1 TECC 1345	Desktop Publishing: Introduction (IBM)	3	(3,1½)	
	C18-2 TECC 1344	Desktop Publishing: Introduction (Macintosh)	3	(3,1½)	
**	C19-1 TECC 2347	Desktop Publishing: Intermediate (Macintosh)	3	(3,1½)	
	C19-2 TECC 2356	Desktop Publishing: Intermediate (IBM/PageMaker)	3	(3,1½)	
	C19-3 TECC 2357	Desktop Publishing: Intermediate (IBM/Ventura)	3	(3,1½)	

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	C20		Testing: Documents	1 (,1)
**	C33-1	TECC 2355	Text Processing for Desktop Publishing (IBM)	3 (3,1½)
	C33-2	TECC 2345	Text Processing for Desktop Publishing (Mac)	3 (3,1½)
	C34	TECC 2441,2322,2343	Technical Writing on Microcomputer (IBM)	3 (3,2)
**	C35-1	TECC 2349	Desktop Publishing: Advanced	3 (3,1½)
	C35-2	TECC 2359	Desktop Publishing: Advanced (IBM)	3 (3,1½)
	C35-3	TECC 2360	Desktop Publishing: Advanced Graphics (Macintosh)	3 (3,1½)

** At least one of this group

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17 Approved Electives

Optional Computer Classes

C4 CSCI 1360	Data Communications & Networks	3 (2,2)
C10	Troubleshooting:	3 (3,2)
C13	Windows Programming	3 (3,2)
C14	Co-op **(mandatory if possible)**	4 (1,20)
C18-1 TECC 1345	Desktop Publishing: Introduction (IBM)	3 (3,1½)
C18-2 TECC 1344	Desktop Publishing: Introduction (Macintosh)	3 (3,1½)
C19-1 TECC 2347	Desktop Publishing: Intermediate (Macintosh)	3 (3,1½)
C19-2 TECC 2356	Desktop Publishing: Intermediate (IBM/PageMaker)	3 (3,1½)
C19-3 TECC 2357	Desktop Publishing: Intermediate (IBM/Ventura)	3 (3,1½)
C25	Windows Troubleshooting	2 (1,2)
C26	Imaging / EDI concepts	3 (3,)
C30	Windows NT	3 (3,1½)
C33-1 TECC 2355	Text Processing for Desktop Publishing (IBM)	3 (3,1½)
C33-2 TECC 2345	Text Processing for Desktop Publishing (Mac)	3 (3,1½)
C34 TECC 2441,2322,2343	Technical Writing on Microcomputer (IBM)	3 (3,2)
C35-1 TECC 2349	Desktop Publishing: Advanced	

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C35-2 TECC 2359	Desktop Publishing: Advanced (IBM)	3 (3,1½)
C35-3 TECC 2360	Desktop Publishing: Advanced Graphics (Macintosh)	3 (3,1½)

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CLASS LIST

A : Academic
C : Computer
X(Y,Z) : credit(lecture,lab)

A1 - ENGL 1301 - Composition I - 3(3,0)

A course devoted to improving the student's writing skills. Emphasis on compositions ranging from five to seven paragraphs in length (500-700 words). An accelerated review of sentence structure, usage and punctuation. Prerequisite: A satisfactory assessment score, completion of ENGL 0310, or (for non-native speakers) ENGL 0349.

A2 - ENGL 1302 - Composition II - 3(3,0)

A continuation of English 1301. Emphasis on persuasive techniques, style, and research skills. Prerequisite: English 1301 or satisfactory score on the CLEP Exam.

A3 - MATH 1314 - College Algebra - 3(3,0)

Topics include functions, polynomials, rational, exponential, and logarithmic functions, and systems of equations and inequalities. A departmental final examination must be passed. Prerequisite: MATH 1312 or satisfactory placement score.

A4 - Business Ethics & Philosophy - 3(3,1)

- Quality Principles
- Teamwork Concepts
- Written Communication
- Oral Communication
- Requirements Gathering
- Customer/Enduser Relations
- Professional Demeanor
- Critique: Give & Take
- Attitude
- Legal & Ethical Standards

A5 - BUSM 2311 - 3(3,0)

** The following should be added to the class BUSM 2311:

- Time Management
- Prioritization
- Project Management
- Documentation
- Presentations
- Effective Meeting Skills

A6 - Business: Specialty - 2-3

A class geared at teaching the student the concepts, terminology and nature of a business area of choice such as:

A6-0 • ACCT 1301 - Office Accounting I
A6-1 • ACCT 2301 - Principles of Accounting I
A6-2 • ACCT 2302 - Principles of Accounting II
A6-3 • TRAV 1304 - Computer Training for Travel Industry
A6-4 • DENA 1301 - Dental Office Management
A6-5 • HRMA 2307 - Hospitality Industry Accounting
A6-6 • MRTN 1203 - Medical Language I
A6-7 • INSU 2201 - Principles of Risk Management & Insurance
A6-8 • INSU 2207 - Management Principles & Problems
A6-9 • PETT 1301 - Petroleum Fundamentals
A6-10• ACCT 2311 - Oil & Gas Accounting
A6-11• BUSM 2313 - Human Relations in Business
A6-12• BUSM 2339 - Wage & Salary Administration
A6-13• BUSM 2320 - Personnel Management
A6-14• SAET 1301 - Introduction to Occupational Health & Safety
A6-15• SAET 1306 - Environmental Controls
A6-16• RECM 2304 - Record Systems Analysis (for Technical Writers)
A6-17• TECC 2305 - Organizing & Managing the Technical Documentation Center (for Technical Writers)
A6-18• SPCH 1315 - Public Speaking

A7 - Business: Analytical Skills - 2(1,2)

(recommendation: A partnership between the College and the Business community, where 'problems' are solicited from and 'donated' by employers, to provide real life situations)

Students are introduced to problems in the business world and learn resolution methods that are creative, imaginative and alternative. Students learn to initiate solutions and be proactive in their approach.

C1 - Introduction to Computers: MS-DOS - 3(2,2)

- CSCI 1310, 1339, 2339
- Lotus
- Word Perfect
- Paradox/DBase
- Text Processing/ Editors
- Installation
- Use of Manual for Self Study & Problem Solving Skills
- System Configuration and Setup

C2 - CSCI 1340 - 'C ' Programming Language I - 4(3,3)

An introduction to 'C' Programming Language. Emphasis is placed upon relating the language to business/scientific problems and applications equally.

- Basic 'C' Concepts
- 'C' Variables, Operators & Expressions
- Logical Flow Control
- Pointers & Arrays
- Functions & program Structure
- I/O & Library Structures
- Structures, Fields & Unions
- Modularization
- Looping
- Designing Business Applications, especially one including database functions
- Dynamic Memory Management (malloc () & free ())

C3 Windows I: Microsoft Office - 3(2,2)

- Use of Windows (also on a Network)
- Word
- Excel
- Power Point
- Installing Windows
- Configuring Windows
- Navigation Using Windows
- Arranging & changing Windows
- Using Program Manager, File Manager & Print Manager
- Changing ICONS
- Moving data between Windows
- Working with different printers/fonts
- Using the clipboard

C4 - CSCI 1360 - Data Communications & Networks - 3(2,2)

A foundation course and hands on approach to data communications using microcomputers in the business environment. Topics include: data transmission, communication software, bulletin boards, information retrieval services and data bases, electronic mail, local area networks, line management, access methods, standards, modems, protocols, topology, networks. Prerequisite: C1

C5 Testing: Systems - 1(,1)

- Test Cases
- Inspections (Design, Code, Test)
- Development & Support
- Documentation
- Testing procedures & debugging techniques

C6 Microfocus Cobol - 3(3,2)

An introduction to Microfocus Cobol: A fundamental course in structured programming techniques.

Emphasis is placed upon relating the language to business applications.

C7 CSCI 2331 - The Systems Development Life Cycle - 3(3,)

** The following should be added to the class CSCI 2331
** Emphasis on P.C.

- Structured
- Top Down
- Modular Code
- Moving to Prototyping
- Introduction to CASE
- Accurately determine user requirements
- Data Definitions
- Data Structures
- Object Oriented Design
- Integration
- Analysis techniques

C8 'C++' Programming - 4(3,3)

An Introduction to Object Oriented Programming. Emphasis is placed upon relating the language to business applications.

- 'C++' Fundamentals
- Object-Oriented Concepts
- Class Libraries
- Single Inheritance
- Multiple Inheritance
- Interfacing with Windows
- Having "hooks" to a LAN/WAN
- 'C++' Extensions to ANSI C
- Operator & Function Overloading
- Development & Use of Windowing Systems in Applications
- Database development & Interfacing
- Implementation of associations between objects and aggregations of objects

Prerequisite: 'C' Programming I

C9 Client/Server - Oracle I - 3(3,2)

- An Introduction to Client/Server technology.
- Data Base Concepts
- SQL query language
- Operators & Functions
- SQL*FORMS
- SQL*REPORTWRITER
- SQL*MENU

C10 - Hardware & Software Troubleshooting - 3(3,2)

- Introduction: Inside the PC
- Keeping Problems away: Preventive Maintenance
- Diagnostics tools
- Circuit Boards
- Power Supplies
- Disk Drives
- Memory
- Printers
- Modems
- Keyboards
- Displays & Display adapters
- Software Problems
- Virus Prevention & Elimination
- Backup & Recovery

C11 - Application Development: AS400 - 3(3,2)

C12 - Application Development: DEC - 3(3,2)

C13 - Windows Programming - 3(3,2)

C14 - CSCI 2443 - Cooperative Education Seminar & Work Experience I
(1 lecture/seminar & 20 hours a week of career-related work experience)

A comprehensive treatment of work-related activities encountered in the student's major area of study. Students must have a job in chosen industry; the supervising employer cooperates with the College to enable students to achieve a blend of work and study.

- This class can be taken multiple times for credit

C15 - Visual Basic / Power Builder - 4(3,3)

Advanced Object Oriented Programming class

C16 - CSCI 2358 - Unix I: Application Development - 3(3,2)

SUN workstation:

- Unix Concepts and Basics
- Using X-windows & Motif
- Manipulation & Printing of files
- Directories
- Shell Basics
- Using the C Shell
- UNIX Processes
- The VI Editor
- UNIX Data Tools
- UNIX Productivity Tools
- Using AT & CRON
- Message Handler

C17 - LAN Administration - 3(3,2)

C18-1 - TECC 1345 - Desktop Publishing: Introduction (IBM) - 3(3,1⅓)

C18-2 - TECC 1344 - Desktop Publishing: Introduction (Macintosh) - 3(3,1⅓)

C19-1 - TECC 2347 - Intermediate Desktop Publishing (Macintosh) - 3(3,1⅓)

C19-2 - TECC 2356 - Intermediate Desktop Publishing (IBM/PageMaker) 3(3,2)

C19-3 - TECC 2357 - Intermediate Desktop Publishing 3(3,1½)

C20 - Testing: Documents - 1(,1)

Test documents for errors, confirm user friendly directions

C23 - LAN II: Hardware/Communications Support - 3(3,2)

LAN Operating Systems:

- Selection & Installation
- Peer to Peer O/S
- Client/Server O/S
- Popular Operating Systems Profiles: Novell's Netware, Lantastic, Microsoft's Windows NT
- Installing Coaxial & Twisted Pair Networks
- Installing & Operating E-Mail
- Network Printing
- TCP/IP
- Voice mail
- Facsimile servers
- Windows for Work Groups

C24-1 - CSCI 1346 - Computer Operations: AS400 - 3(3,2)

AS400:
Operation System troubleshooting, input-output & storage devices, powering up and down of the system, operation of console and console keyboard, program interrupts, interpretation of console messages, operation of printers, disk management, preventive maintenance, power supplies, memory Organization, modems, keyboards, display & display adapters. Adding users, workstations & printers. Security issues. Optimization.

C24-2 - Computer Operations: DEC - 3(3,2)

DEC:
Operation System troubleshooting, input-output & storage devices, powering up and down of the system, operation of console and console keyboard, program interrupts, interpretation of console messages, operation of printers, disk management, preventive maintenance, power supplies, memory Organization, modems, keyboards, display & display adapters. Adding users, workstations & printers. Security issues. Optimization.

C25 - Windows Troubleshooting - 2(1,2)

- Trouble Shooting Windows
- Tuning windows, Optimizing Response time
- Memory management with Windows

- Utilizing the various video options/resolution types
- Installing Applications
- Integrating Applications
- Using an application within a Window
- Using DOS applications within a Window
- Installing, Configuring, Trouble Shooting & Tuning Windows on a Network
- Optimizing Windows/Response Time
- Working with different printers/fonts
- Managing the disk
- Understanding the modes (standard, 386 enhanced)
- Using the clipboard
- Utilizing the various video options/resolution types

C26 - Imaging, EDI concepts - 3(3,)

Basic concepts of Imaging and EDI (Electronic Data Interchange) and their role in the business world

C27 - 'C' Programming II - 3(3,2)

- The 'C' Processor
- Error Handling
- I/O System Calls
- Directories

- Standard Library Routines
- Process System Calls
- Environment
- Pipes
- Portability & Efficiency

C28 - Oracle II - 3(3,2)

- Optimizing System Performance: Indexing & Clustering
- Programming using PRO*C
- Oracle Utilities
- SQL*CALC
- Data Base Security

C29 - Unix II - 3(3,2)

C30 - Windows NT 3(3,1½)

C31 - Novell Network Administration Certification - 3(3,2)

A preparation class for the Novell Network Administration Certification

C32 - Novell CNE Certification 4(3,3)

A comprehensive preparation class for the Novell Certified Network Engineer Certification

C33-1 - TECC 2355 - Text Processing for Desktop Publishing (IBM) 3(3,1⅓)

C33-2 - TECC 2345 - Text Processing for Desktop Publishing (Macintosh) 3(3,1⅓)

C34 TECC 2441,2322,2343 - Technical Writing on Microcomputers (IBM) 3(3,2)

C35-1 TECC 2349 - Advanced Desktop Publishing (Macintosh) 3(3,1⅓)

C35-2 TECC 2359 - Advanced Desktop Publishing (IBM) 3(3,1⅓)

C35-3 TECC 2360 - Advanced Graphics for Desktop Publishing (Macintosh) 3(3,1⅓)

Skills for the jobs: PA - Programmer Analyst HT - Hardware Technician HD - Help Desk/ Trouble Shooter TR - Trainer OP - Operator TW - Technical Writer PC - P.C. Coordinator NA - Network Administrator SA - System Administrator	PA	HT	HD	TR	OP	TW	PC	NA	SA
Spread Sheet - at least one	M	D	M	M	D	M	M	M	M
Spread Sheet - multiple	HD		M	M		M	M	D	D
Word Processing - at least one	M	HD	M	M	HD	M	M	M	M
Word Processing - multiple	D		M	M		HD	M	D	D
P.C. Data Base: Relational - at least one	M	D	M	M	D	HD	M	M	M
P.C. Data Base: Relational - multiple	HD		M	M			M	D	D
MS-DOS	M	M	M	M	M	HD	M	M	M
Use Windows	M	M	M	M	M	M	M	M	M
Use a LAN	M	M	M	M	M	M	M	M	M
Graphics / Desktop presentation tools: at least one	HD		M	M		M	M	D	D
Software & Hardware Troubleshooting	M	M	M	M	HD	D	M	D	D
Check Cable Connections	HD	M	M	M	M	HD	M	HD	H
Software Installation & modification	M	M	M	M	HD		M	M	M
System Configuration & Setup	D	M	M	M	HD		M	M	M

M - Mandatory
HD - Highly Desirable
D - Desirable
blank cells - not recommended for this job's curriculum 1

Skills for the jobs: **PA - Programmer Analyst** **HT - Hardware Technician** **HD - Help Desk/ Trouble Shooter** **TR - Trainer** **OP - Operator** **TW - Technical Writer** **PC - P.C. Coordinator** **NA - Network Administrator** **SA - System Administrator**	**PA**	**HT**	**HD**	**TR**	**OP**	**TW**	**PC**	**NA**	**SA**
All "Specification/ Design & Analysis Skills"	M					D			
Installing, configuring, troubleshooting & changing Windows - stand alone & Network	D		M				M	M	M
Installing Applications, Application Integration within Windows	M		M				M	M	M
Visual Basic, Power Builder (Object Oriented)	HD		D	D			D		
'C' - all competencies	M								
'C++'	M								
Focus	D								
Small Talk	D								
Unix - Application Systems Development & Support	HD		D	D			D		
Unix - Operating System & Telecommunication support skills			HD					HD	HD
LAN - Administration: Resource Planning, tuning, application, security: using Novell, Lantastic, Windows for Work Groups	HD		HD		D		HD	M	M
LAN - Hardware/Telecomm support skills using Novell, Lantastic, Windows for Work Groups	D	M	HD		D		HD	M	M

M - Mandatory
HD - Highly Desirable
D - Desirable
blank cells - not recommended for this job's curriculum 2

Skills for the jobs: PA - Programmer Analyst HT - Hardware Technician HD - Help Desk/ Trouble Shooter TR - Trainer OP - Operator TW - Technical Writer PC - P.C. Coordinator NA - Network Administrator SA - System Administrator	PA	HT	HD	TR	OP	TW	PC	NA	SA
Client Server - Oracle I	M	D	HD	D			D	HD	HD
Client Server - Oracle II (advanced)	M			D			D	D	D
BASIC MAC features	D		D	D		D	D		
Operations skills: (at least one of: AS400, DEC)	D	HD	D		M			HD	HD
Application Development for (at least one of: AS400, DEC)	M								
Microfocus COBOL	M		D	D			D		
English: Proper grammer & spelling: written & verbal skills	M	M	M	M	M	M	M	M	M
Communication & Presentation skills: team work, attitude, critique, requirement gathering	M	M	M	M	M	M	M	M	M
Analytical Skills: Problem layout & possible solution	M	HD	HD		HD			M	M
Organizational Skills: Time Management, prioritizing deadlines, documentation, project management	M	HD	M	M	HD	M	M	M	M
'Self Starter' Skills: learn from manual, initiative, creative approach	M	M	M	M	M	M	M	M	M
Math: College Algebra	M	M	M	M	M	M	M	M	M
Business Skills: Accounting I, inventory control etc.	HD		HD		HD				

M - Mandatory
HD - Highly Desirable
D - Desirable
blank cells - not recommended for this job's curriculum

Skills for the jobs: **PA - Programmer Analyst** **HT - Hardware Technician** **HD - Help Desk/ Trouble Shooter** **TR - Trainer** **OP - Operator** **TW - Technical Writer** **PC - P.C. Coordinator** **NA - Network Administrator** **SA - System Administrator**	**PA**	**HT**	**HD**	**TR**	**OP**	**TW**	**PC**	**NA**	**SA**
Testing: Systems	M	M	M	M			M	M	M
Testing: For Technical Writers	HD		HD			M			
Legal & Ethical standards	M	M	M	M	M	M	M	M	M
Cooperative Education Seminar & Work Experience (Mandatory if possible!)	M	M	M	M	M	M	M	M	M
Accounting II	D								
Philosophy of how to run a business: quality etc.	M	M	M	M	M	M	M	M	M
Imaging/EDI	D					D			
Microsoft Office: Windows, Word, Excel, Power Point	M		HD	HD		HD	HD	HD	HD
Desktop Publishing						M			
Windows NT	D	D	D	D			D	M	M
Novell Certifications	D							D	D
Voice mail, Facsimilie servers								HD	HD

M - Mandatory
HD - Highly Desirable
D - Desirable
blank cells - not recommended for this job's curriculum 4

Implementation Plan

1. Meet with non computer departments that have classes that are part of our Computer curriculum. Update them on the employer feedback that we received that related to their areas. Give them our thoughts on meeting these employer needs and solicit their advice on the best way to meet these needs. Change our curriculum as needed. If required, consider adding classes or modifying classes (or sections of classes) as recommended by these departments. English skills include: writing executive summaries, shades of meaning, and reading and writing technical documents. Business skills include quality principles, teamwork concepts, time management and prioritization.

2. Review the list of computer classes and rank them on the basis of how difficult it would be to offer them at Northwest College. The difficulty level would be based on two components: qualified faculty pool and suitable equipment.

3. Same as 2. but on an H.C.C.S. wide basis. Although it is highly desirable that most of the courses be available at Northwest College, it is essential that enough of the classes be available collegewide for the student to take a curriculum that meets his or her expectations and will likely lead to a job. Faculty and equipment are key here.

4. Use judgement, modify the curriculum so that the programs can be offered. Consider:

    - having specialized adjunct staff teach at various H.C.C.S. Colleges and Campuses. This will provide the unique expertise available where it's needed. It also provides the flexibility of having the proper specialty on staff as required.

    - trying to minimize students having to attend different campuses

5. Develop detailed syllabi for classes that will be offered. This requires people that know the subject and can lay out a curriculum.

6. Actively recruit students. This requires people familiar with the curriculum, how it was arrived at, and are enthusiastic about it. Key players include H.C.C.S. recruiters and counselors, and Spring Branch Computer teachers and counselors. Especially in the early stages of this program, this step is critical. After the program is established the program should sell itself, but it must get an early boost from people who care about it.

7. Identify what's needed to offer those classes that were omitted in 4. Offer as the program grows.

8. Continue regular communications with the existing employer base and continue to expand the employer base. Change the curriculum to match changing employer requirements. This needs to be vigorously done, otherwise the program will become obsolete. If it is done vigorously then we will maximize the chances of the student finding suitable employment.

TECH PREP

MINUTES FOR ADVISORY COMMITTEE MEETING

With Updates

APRIL 12, 1993

3-5 PM

Northwest Campus

Houston, Texas

Jeff Kroll

June 7, 1993

Voting Members

George Anna Bobo	Union Texas Petroleum	968-2158
Shane Boothe	Cadysys	669-0700
Pam Garret	Union Texas Petroleum	Alternate UTP
Charlotte Hambley	Halliburton Geophysical	778-3221
Bill Kimball	BMC Software	274-7880
Robert Lewis	McGinnis Cadillac	496-8700
Durenda McClenney	Halliburton Geophysical	778-3420
W.C. Norton	Norton Computing	531-5565
Ron Ober	Ober-Tech	879-4054
Rob Sherlin	Compaq	374-6066

Nonvoting Members

Craig Adams	HCC	855-6622
Frank Biggs	Spring Branch ISD	461-2921
Kim Cook	HCC	466-6654
Curtis Floyd	HCC	492-7236
Jeff Kroll	HCC	466-6654 x19
John McMahan	HCC	469-6179
Elaine Novak	HCC	466-6654
Linda Russell	Spring Branch ISD	461-2920

Members Present: George Anna Bobo, Shane Booth, Charlotte Hambley, W.C. Norton, Ron Ober, Craig Adams, Frank Biggs, Kim Cook, Jeff Kroll, John McMahan, Elaine Novak, Linda Russell

Members Absent: Bill Kimball, Robert Lewis, Rob Sherlin, Curtis Floyd

Contributors After the Meeting: Rick Bull (Acufleet), Evelyn Timmins (Texas Commerce Bank), Sharie Iarkin and Rick O'Brien (Production Operators), Bob Frazier (Houston Lighting and Power), Bill Kimball, Robert Lewis

Overview

The Tech Prep Advisory Board conducted their first meeting using Total Quality Management (TQM) techniques. Jeff Kroll was the Team Leader, Craig Adams was the Recorder, and Kim Cook was the Time Keeper.

An agenda with a target time for each topic, and a page with each topic with appropriate key words and thoughts were provided to each member. Jeff Kroll then introduced each topic separately. Information included in the introduction came from several sources but the main source was Houston employer interviews of both Board Members and non Board Members. All members simultaneously marked their thoughts on each topic on a piece of note paper. When all thoughts were written and collected and posted on the board, Jeff reviewed them, a general consensus was reached and then we moved on to the next topic.

The format of the minutes shows what was presented to the attendees followed by their input. A. shows what was originally presented, B. shows the Board Member April 12 input, and C. shows inputs from employers interviews after the April 12 meeting.

Tech. Prep. Advisory Committee Meeting
Agenda
April 12, 1993

I. Introductions	5 minutes
II. Purpose of the meeting	5 minutes
III. How the Meeting will be conducted	5 minutes
A. Total Quality Management	
1. Leader	
2. Time Keeper	
3. Recorder	
4. Parallel Processing	
B. Respect for attendees' time	
IV. General Information	15 minutes
A. Goals	
B. Competencies	
C. Large Company Hiring Practices	
D. Jobs	
E. Basic computer skills	
V. Drilling down on specific skills	60 minutes
A. Specifications/Design	
B. Windows	
C. "C"/"C++"	
D. UNIX	
E. LANS	
F. Client/Server	
VI. Related topics	20 minutes
A. IBM (and clones) vs Apple	
B. Tough future	
C. English	
D. Math	
E. Teams	
F. Business Skills	
G. Recommendations for testing	
VII. Next Steps	10 minutes
A. Summary	
B. What needs to be done next	
C. Schedule next meeting	

I. GOALS

A. Originally Presented

-Furnish employable people in the Computer/Information Systems field from the Spring Branch High Schools and H.C.C.

-Eliminate outdated subjects and subjects of minimal value from the curriculum

-Eliminate redundancy from the curriculum

-Create a curriculum that logically fits - do not go from "higher to lower learning"

-Set realistic expectations for the student

II. Group Competencies into Courses

A. Originally Presented

-Group courses into curriculum for specific jobs

-A competency can be placed in more than one course as long as both courses are not in the same curriculum

III. Large Company Hiring Practices

A. Originally Presented

-Multitalented/languages
-Flexible/Adaptable
-Willing to learn new things
-Happy to do what's asked of them
-Realistic expectations
-Provide imaginative solutions to get the job done
    -initiative
    -alternatives
    -creative
-Problem solvers
-Can pick up the manual in a new area
-Mature

B. April 12 Minutes

The Advisory Committee added "Team Player" to the above list.

(A4 - Business Ethics & Philosophy)

C. Post April 12 Employer Interviews

Bob Frazier stated that Houston Lighting & Power requires a 4 year degree in Information Systems or a related technical field to be hired as a Programmer Trainee. H.L.&P. expects p.c. literacy, including spread sheet, word processing and data base knowledge. The specific products are an asset but not mandatory. Other requirements are:

-Good Business Background, including: 6 semester hours of Accounting. (Economics, Business Statistics, and General Management are assets).

(A6 group)

-Evidence of having worked on projects where the student was part of a team

-Good Verbal and Written Communication skills

(A1,A2,A6-18 - ENGL 1301, ENGL 1302, SPCH 1315)

Production Operators also requires a 4 year degree for their programmer jobs. Sharie Larkin recommended that high school students take a class in book keeping.

To assess the students' written skills, as part of the interview process, the student is asked to write a letter on why they feel their background/skills fit with the job that they interviewed for at H.L.&P.

Good grades, extracurricular activities (especially in a leadership role), and a relevant job while attending school are also important.

Bob gave the following percentages in weighting the importance of the various factors in the hiring decision:

-Business Education and Experience: 25-30%
-Technical Education and Experience: 25%
-Teamwork: 20%
-Communication Skills: 20%
-Other: 5-10%

(A6 group for business background)

Production Operators looks for people who can "clear the problem" and are not "note passers." This fits with the recurring theme of problem solving people. Production Operators looks for people who have a good attitude, including individuals who look for opportunities to do more work to improve things. They expect people to go to their supervisors with problems and a recommended solution.

(A4 - Business Ethics & Philosophy, A7 - Business: Analytical Skills)

IV. JOBS

A. Originally Presented

-Programmer/Analyst
-Hardware Technician/P.C. Repair - install and move equipment - wiring
-Help Desk - Trouble shooters
-Trainers
-Operators
-Contract Work
-Technical Writers

The Advisory Committee added the following jobs to the above list:

B. April 12 Minutes

-P.C. Coordinator
-Network Administrator

C. Post April 12 Employer Interviews

At an employer interview after the meeting, the employer stated that he hires people out of technical schools to set up p.c.'s, upgrade p.c.'s, cable and set up networks. At a separate interview Evelyn Timmins noted that Texas Commerce buys the parts for their p.c.'s and assembles them in house.

(C10 - Hardware & Software Troubleshooting)

Evelyn Timmins identified Imaging as an area that could be looked into.

(C26 - Imaging, EDI concepts)

Production Operators would hire right out of high school for a receptionist/switch board position. This could lead to a clerk position if the individual had good data entry/typing skills. This could in turn lead to a secretary/clerk position using word processing and spread sheets. They felt that a high school graduate could fill a help desk position.

Production Operators has a Junior Operator position that could be

handled by a High School graduate. This position operates their WANG minicomputer and mans the help desk. They would consider an H.C.C. graduate for technical repair, training, and LAN Administration and Security (if the person had the right hands on training).

(C4 - Data Communications & Networks, C24 group: Computer Operations)

Bill Kimball noted that working through operations type jobs has long been a good way to break into a Programmer/Analyst type position.

BMC looks for experts in their field.

(A6 group)

V. Basic Computer Skills

A. Originally Presented

-Spreadsheets (Excel, Lotus)

(C1 - MS-DOS, C3 - Microsoft Office)

-Word Processing (Word, Word Perfect)

(C1 - MS-DOS, C3 - Microsoft Office)

-Data Base -(DBase III+/IV, Paradox, DBase Clones -Clipper-Fox Prc)

(C1 - MS-DOS, C3 - Microsoft Office)

-Novell

(C4 - Data Communications & Networks, C23 - LAN II: Hardware/Communications Support, C31, C32 - Novell Certification)

-Use Windows

(C30 - Windows NT, C13 - Windows Programming, C3 - Windows I: Microsoft Office, C25 - Windows Troubleshooting)

B. April 12 Minutes

Multiple people felt that MS-DOS be included.

(C1 - MS-DOS)

There was support for an integrated software product. Microsoft Works was suggested. It was suggested that this be furnished at the High School level. Word Perfect Works and LOTUS Works were also recommended.

(C3 - Microsoft Office)

Knowing how to use a Local Area Network (LAN) was recommended.

(C4 - Data Communications & Networks, C23 - LAN II: Hardware/Communications Support, C31, C32 - Novell Certification)

Lantastic for Windows was recommended by Rick Bull after the April 12 meeting. He suggested one networking class, comprised of 2 hours of lecture and 2 hours of laboratory per week, that focused on Novell and Lantastic. *(C4, C23, C31, C32 as above)*

Quatro Pro was suggested in the Spread Sheet Category.

In the Data Base category, Alpha Four was recommended.

A graphics category was recommended. This category would include Freelance, Draw Perfect and Harvard Graphics.

(C35-3 TECC 2359 - Advanced Graphics for Desktop Publishing)

Other Basic Skills that were recommended were:

- Software and Hardware Troubleshooting
- Cable Connections
- Software Installation and Modification
- System Configuration and Setup

(C10 - Hardware & Software Troubleshooting)

C. Post April 12 Employer Interviews

At an employer interview following the meeting, an employer suggested teaching Microsoft Office. This would encompass Windows and the following software under Windows: Word, Excel and Power Point. Like many other companies this company is moving from Lotus and Word Perfect to Excel and Word to get under the Microsoft umbrella. The feeling was the Microsoft software would take advantage of Windows and new developments in Windows before Microsoft's competitors.
(C3 - Microsoft Office)

Paradox was also found to be popular at two employer interviews following the meeting. At Texas Commerce Bank, it's their standard and at another employer it's the data base engine that's behind Visual Basic.
(C1 - MS-DOS)

At two employer interviews following the meeting, it was noted that they use desk top publishers. However, neither employer recommended a specific package and both felt that the general concepts were what was important.
(Desktop Publishing classes: C18 group, C19 group, C33 group, C34, C35 group)

Production Operators recommended relational data base concepts and relational programming They also felt that it was better to have a working knowledge of 3 programming languages as opposed to being expert in 1.

BMC noted the need for relational data bases distributed across lans.

BMC also pointed out the need for back up and recovery skills.
(C10 - Hardware & Software Troubleshooting)

VI. "Specifications/Design and Analysis"

A. Originally Presented

-Structured
-Top Down
-Modular code
-Moving to prototyping
-Introduction to CASE

B. April 12 Minutes

Analysis was included in this category and Analysis techniques were recommended. This included how to accurately determine user requirements.

Other recommendations included: data definitions, data structures, object oriented design, integration skills, testing procedures and debugging techniques.

(C7 - The Systems Development Life Cycle)

C. Post April 12 Employer Interviews

H.L.&P. was the only employer that I interviewed that was using CASE (Computer Aided Software Engineering) products (both upper and lower case), RAD (Rapid Application Development), and JAD (Joint Application Development). They offer extensive RAD training to their systems development employees. Training involves 15% of all paid hours in a year the person attends. All systems development employees will attend over 3 years. They also use CASE tools for some COBOL maintenance.

VII. Windows

A. Originally Presented

-Versus OS/2
-Windows NT

B. April 12 Minutes

There was a strong consensus that Windows was very important. There was no support for OS/2. Both Windows for Work Groups and Windows NT garnered support.

The skills recommended under Windows were:

- Installing Windows
- Configuring Windows
- Trouble Shooting Windows
- Tuning Windows
- Navigation using Windows
- Arranging and Changing Windows
- Using Program Manager, File Manager and Print Manager
- Changing ICONS
- Installing Applications
- Integrating Application
- Using an Application within a Window
- Using DOS Applications within a Window
- Installing, Configuring, Trouble Shooting and Tuning Windows on a Network
- Moving Data between Windows
- Using Visual BASIC

One employer brought out that her company required 2 years of Windows experience when hiring programmers.

(C3 - Windows I: Microsoft Office, C13 - Windows Programming, C25 - Windows Troubleshooting, C30 - Windows NT)

C. Post April 12 Employer Interviews

Rick Bull added the following skills:

- Optimizing Windows/Response Time
- Working with different printers/fonts
- Managing the Disk
- Understanding the modes (standard, 386 enhanced)
- Using the clipboard
- Utilizing the various video options/resolution types

(C25 - Windows Troubleshooting)

At an employer interview following the meeting, the employer added weight to using Visual Basic under Windows. A significant amount of their custom applications are being built in Visual Basic. This employer also looks for "C" training as "'C' is the basis for Visual Basic."

At this same employer interview, the employer speculated that Windows NT would replace Novell at his shop.

(C30 - Windows NT)

VIII. "C"/"C++ and Other Languages of the Future"

A. Originally Presented

-Object Oriented
    -Windows

B. April 12 Minutes

There was a strong sentiment among the advisory committee that "C" and "C++" be taught. One employer recommended teaching the latest object oriented version of "C."

The "C/C++" competencies recommended were:

- Pointers (C)
- Structures (C)
- Class libraries (C++)
- Inheritance (C++)
- Modularization
- Looping
- Designing a Business Application, especially one including database functions.
- Interfacing with Windows
- Having "hooks" to a LAN/WAN

(C2 - 'C' Programming Language I, C8 - 'C++' Programming)

Other languages that generated some support were:

- Focus because of its ability to run on many platforms - portability

- Small Talk (a leading Object Oriented Language)

C. Post April 12 Employer Interviews

At her interview, following the meeting, Evelyn Timmins recommended Microfocus COBOL. Bob Frazier is also looking at Microfocus COBOL.

(C6 - Microfocus Cobol)

BMC uses Focus for report writing.

Visual Basic was recommended by another employer.

(C15 - Visual Basic / Power Builder)

IX. UNIX

A. Originally Presented

-Open Systems

-X Windows

-TCP/IP - UNIX Work group (Suns)

B. April 12 Minutes

The Advisory Committee members had difference of opinions on the role of UNIX in the Computer Curriculum. The opinions initially ranged from "that students should know what it is; however, it's too specialized to include in the curriculum." to "it's the wave of the future, and it's portable and hardware platform independent."

The situation resolved itself when there appeared to be general agreement that there would be a lot of Computer jobs with and without UNIX in the future.

The topics that the Advisory Committee members recommended under UNIX were:

- Motif
- X Windows
- Script Writing
- TCP/IP Terminal Usage
- Trouble Shooting
- C++ and Database programming

(C16 - CSCI 2358 - Unix I: Application Development, C29 - Unix II)

It was noted that frequently R&D position require UNIX and X Windows. The largest UNIX base seems to be on Sun, HP and RS6000 series platforms.

X. LANS

A. Originally Presented

-Network Planning
-Problem Diagnostics
-File Transfer
-Mail
-Remote Log Ins
-Bus
-Ethernet
-Token Ring
-Lantastic (Peer to Peer)
-Windows for Work Group (Peer to Peer)
-Bridges
-Security

B. April 12 Minutes

There was general consensus that LANS belonged in the curriculum and that students should have a good understanding of LANS and Telecommunications concepts.

Recommendations for a LAN curriculum were:

- Managing Networks
- Managing Groups
- Installing Coaxial and Twisted Pair Networks
- Installing and Operating E-Mail
- Trouble Shooting Skills
- Modem Operations
- Network Printing
- Installing Applications
- Basic Topologies
- Basics of Novell, TCP/IP, Windows for Work Groups, Windows NT

(LAN classes: C4 - Data Communications & Networks, C23 - LAN II: Hardware/Communications Support, C31, C32 - Novell certification)

C. Post April 12 Employer Interviews

Rick Bull recommended the following:

- Voice mail (special card in the p.c. & microphone)
- Facsimile servers

(C23 - LAN II: Hardware/Communications Support)

XI. Client/Server

A. Originally Presented

-SQL
-Oracle vs Sybase

B. April 12 Minutes

There was interest in Oracle but no interest in Sybase.

(C9 - Client/Server - Oracle I, C28 - Oracle II)

SQL was deemed to be important; however, there was concern there might not be room in the curriculum for it.

C. Post April 12 Employer Interviews

Two employer interviews after the meeting identified that these employers were using SQL servers.

Houston Lighting and Power is considering Sybase as an SQL server for H.L.&P.'s Novell/Token Ring LAN.

XII. IBM (and clones) vs Apple

B. April 12 Minutes

Over half the group felt that only IBM (and clones) should be taught in the micro environment. One member felt that there was a "very small learning curve vs a very large price" for Apple and that the Apple was almost self teachable.

From the part of the Advisory Committee that felt that Apple should be included the following recommendations were made:

- Apples should be specified for graphics users
- The Intel platform should be stressed
- Macs should be in the program but advanced concepts need not be taught for it
- Apple should be used slightly

(The Desktop Publishing classes offer exposure to the Macintosh: C33-2, C35-1, C35-3)

A member suggested the following configuration for an IBM clone:

- 486 processor
- 8 megabytes of RAM
- 170 megabyte hard drive

Other platforms that the Committee recommended (time and funds permitting) were:

- AS/400 (had the largest amount of backing)
- Digital Equipment
- Sun

(C11 - Application Development: AS400, C12 - Application Development: DEC)

C. Post April 12 Employer Interviews

At an employer interview following the meeting, this employer noted that Macs were used extensively for making presentations.

Rick Bull suggested that the student should know how to operate the Apple.

Bill Kimball stated that BMC uses Macs and Page Maker for desk top publishing.

(There are 11 Desktop Publishing classes for IBM and Macintosh: C18 group, C19 group, C20, C33 group, C34 & C35 group)

XIII. Tough Future - Difficult Competition

A. Originally Presented

-Pascal
-FORTRAN
-COBOL - (Microfocus COBOL?)

B. April 12 Minutes

Their was general agreement in this area on the following:

- A language should be taught that teaches logic and common language constructs (eg. If, Then, Else etc.). COBOL was the suggested language because versions of it run on mainframes and p.c.'s for business applications. Many businesses have a major investment in COBOL.

- Pascal is great for teaching structured programmer; however, it has limited application.

- RPG didn't receive any support and one person came out against it. There was no discussion about the different types of RPG (eg. RPG II, RPG III, or RPG 400).

(C2 - 'C' programming Language I, C6 - Microfocus Cobol, C8 - 'C++' Programming, C27 - 'C' Programming II)

C. Post April 12 Employer Interviews

Evelyn Timmins felt that the programming concepts needed for C++ should be taught in that class. She felt the basis for them should not be taught in Pascal, and that Pascal should not be taught.

Evelyn strongly supported Microfocus COBOL for developing applications on p.c.'s. Bob Frazier is also looking into Microfocus COBOL.

Production Operators recommended that 1 course in COBOL be taught. They have also committed to move from RPG on their WANG.

(C2 - 'C' programming Language I, C6 - Microfocus Cobol, C8 - 'C++' Programming, C27 - 'C' Programming II)

XIV. English

A. Originally Presented

-Proper grammar and spelling
-Shades of meaning
-Communication skills - convince management and peers
-Customer Relations
-Executive Summary
-Make an impression
    -Presentation
    -Memo
-Problem layout and possible solutions
-Status Reports
-Documentation

(A1 - ENGL 1301, A2 - ENGL 1302, A4 - Business Ethics & Philosophy, A5 - BUSM 2311)

B. April 12 Minutes

The subject of English continued to bring out broad based support as part of the Computer curriculum. The comments made and agreed on were:

- Communication skills are the difference between an Information System Professional and a Computer Nerd

- It's imperative that students master good verbal and written skill before graduating from high school

- Presenting a paper or a verbal presentation in industry requires good English skills. The person must also present a professional appearance.

- Comprehending and presenting the main idea of a topic require proper English skills.

- Reading and writing technical documents require strong English skills.

(A1 - ENGL 1301, A2 - ENGL 1302, A4 - Business Ethics & Philosophy, A5 - BUSM 2311)

C. Post April 12 Employer Interviews

Rick Bull suggested Computer Acronyms be included.

Evelyn Timmins noted that she hires people with degrees in various

academic fields with good English skills for Technical Communications. She found that it was difficult to teach a technician good English.

At another employer interview following the meeting, the employer noted that many former programmers apply for technical writing jobs.

XV. Math

A. Originally Presented

-Range:Basic Math through Trigonometry

B. April 12 Minutes

The Advisory Committee came to a quick and unanimous conclusion that math knowledge through Algebra is both necessary and sufficient. It was felt that Algebra should be stressed.

(A3 - MATH 1314)

C. Post April 12 Employer Interviews

Bob Frazier suggested statistics. He also felt that although their is not much application for Calculus in the business world; it is impressive that a student had the ability to understand it well enough to pass.

XVI. Teams

A. Originally Presented

-Tolerant of others

C. Post April 12 Employer Interviews

It was noted at employer interviews following the meeting that most assignments are as part of a team. It was also a key hiring consideration at H.L.&P.

Robert Lewis stated that departments within McGinnis Cadillac operated like individual businesses. Paying for additional help came out of a general salary pool. The team could choose to bring in extra help but the pay for this extra help would come from the salary pool, thus the team could receive larger checks by working together to avoid extra help.

Cross training is used at McGinnis.

Bill Kimball stated that technical skills won't get someone hired at BMC no matter how strong their technical skills are; team work and communication skills were required.

(A4 - Business Ethics & Philosophy, A5 - BUSM 2311, A6 group - for business specialty)

XVII. Time Management

A. Originally Presented

-Many simultaneous activities

C. Post April 12 Employer Interviews

Bill Kimball stated a need for perc charts, noting dependencies and attention to deadlines. The amount of time spent on the task was not important at BMC, getting it done on time was.

(A5 - BUSM 2311)

XVIII. Project Management

A. Originally Presented

-Have in High School

B. April 12 Minutes

The additional competencies that the Advisory Board Recommended were:

- Knowing how to prioritize tasks
- Managing ones time in the face of deadlines and multiple tasks
- Being able to constructively critique work
- Using others' criticism to improve on one's work
- Having the interpersonal skills that allow one to function as a contributing member of a team. There was a question on being able to teach this.

C. Post April 12 Employer Interviews

Evelyn Timmins stated that people needed to be able to work on multiple projects and "change channels" rapidly.

(A4 - Business Ethics & Philosophy, A5 - BUSM 2311)

XIX. Business Skills

A. Originally Presented

-Tied to communications
-Needed for advancement
-Professional demeanor
-Analytical thinking
-Entry level accounting
-Inventory control

B. April 12 Minutes

The Advisory Committee had the following recommendations:

- Basic Accounting and Inventory Control
- A class project that built, automated and integrated common business applications such as Accounting and Inventory functions
- Philosophy classes in the areas of:
    - Logic (for analytical thinking)
    - "Quality Philosophy (for awareness, eg. Covey, Deming)
- Keyboarding (for speed, accuracy and higher productivity)

C. Post April 12 Employer Interviews

Other skills identified at employer interviews after the meeting were:

- Professional appearance
- Consulting (identifying business opportunities, presenting solutions to problems and solving them)
- Developing relationships
- Critiquing and being critiqued
- Dealing with others; being a people person

Employers noted that they looked at resumes to see if the applicant had produced a professional looking document (eg. laser printing and an appealing layout).

Production Operators stated the need to understand controls and suggested a high school book keeping class. People need to know what the business is doing. They must be able to business justify themselves.

(A6-1 ACCT 2301, A6-18 SPCH 1315, A4 - Business Ethics & Philosophy, A5 - BUSM 2311)

XX. Recommendations on Testing for Competencies

A. Originally Presented

Benjamin Bloom Taxonomy

1. *Knowledge*
2. *Comprehension*
3. *Application*
4. *Analysis*

B. April 12 Minutes

Members of the Advisory Committee had the following recommendations that were unanimously accepted:

-Assign the student a project and check that the objectives were met. Also check that the student knows what tools/products to use to get the job done.

-Have the student turn the completed project over to another student for that student to maintain. Additional beneficial training here are: communications skills (transfer of knowledge) and teamwork.

C. Post April 12 Employer Interviews

-Rick Bull suggested that students be put in a situation to recommend ideas to an end user after the end user presented the problem.

(C5 - Testing: Systems, C20 - Testing Documents, C7 - The Systems Development Life Cycle)

XXI. Ethics

B. April 12 Minutes

The Advisory Committee agreed that legal and ethical standards need to be part of the Curriculum.

(A4 - Business Ethics & Philosophy)

Technical Preparation

Facts and Opinions

Computer Science Careers

Houston Community College System

Northwest College

Spring Branch ISD

June 1993

Jeff Kroll
May 27, 1993

FINDINGS

I. Problems

Although there are numerous opportunities for a career in the computer field; these opportunities are not what they have traditionally been.

Large employers, especially in the energy industry, are not hiring significant numbers of computer professionals. When they hire people for their Computer groups, they typically want professionals with at least 5 years experience and preferably a 4 year degree.

There is a huge void in certain areas Computer areas. These jobs are often contracted out or performed by personnel in the end user departments. Tasks performed include:

- network administration
- network trouble shooting
- desk top network support
- system administration
- installing p.c. hardware and software
- p.c. trouble shooting and repair
- training (especially p.c. software)
- file transfer
- report writing
- technical writing

People with 4 year Computer science degrees may be overtrained for these positions and people without sound Computer training cannot perform these tasks. These jobs often lead to Systems Analyst jobs.

One advisory board member felt that students right out of high school would find their best opportunity to be in p.c. repair or on site technician.

Rick Wannemacher, Shell's Staff Development Manager, stated that 3-4 years ago that Shell hired 200-250 computer people each year. Today that number is 25-30. Rick does not expect this number to change in the next 3-5 years. Shell requires a Bachelors degree or experience, and preferably a Master degree for these jobs. He stated that it didn't make any difference what courses a student with less school than that takes. He didn't want to raise false expectations.

Cindy Creeden, responsible for entry level Computer people hiring, also spoke of tough times at Brown & Root. She stated that Brown & Root hadn't hired an entry level computer person from high school or college in 10 years. She also stated that they did try to hire entry level people a few years ago but didn't go about it properly.

Durenda McClenney, Manager of Personnel Administration at Halliburton Geophysical Services, stated that Halliburton's hiring was consistent with my other findings. Hiring is minimal, intern hiring was discontinued years ago, and when a position became available it went to an experienced person. Durenda spoke about how experienced people were preferred over people right out of schools. Recent students tended to have unrealistic expectations.

George Anna Bobo, Manager, Corporate Information Resources Management Information Systems at Union Texas Petroleum, spoke of downsizing there. Union Texas Petroleum has downsized their staff by 80% over the last 3 years. Today they have about 30 people in the Information Systems group. The Computer people who remain at Union Texas Petroleum are those that are flexible, willing to do whatever the job takes and are able to learn new skills. These new skills may have to be learned from a manual.

Rob Sherlin, Manufacturing and Materials System Manager at Compaq, said that new Computer employees needed a minimum of 5 years experience. Degrees were not required but were preferred.

Shirlie Pacetti, Project Director for Project Independence, was told by her Advisory Board that in order to get a job in the Computer field that recent graduates had to be very proficient in a list of current computer technologies as they would be competing for the same jobs with 4 year college graduates with 5 years experience.

Houston Lighting & Power, American General and Production Operators require 4 year technical degrees for entry level programming jobs.

Margot Murdock, Information Systems Director at American General, stated that American General hires about 6 Programmer Trainees twice per year. American General is now hiring the best Computer Science students at the 4 year Universities. Margot noted that these students used to go to work at the big energy companies when these companies were experiencing better economic times.

II. What's Not The Solution

As the Management Information Systems Director at a major local business (who would only agree to talk with me if I promised anonymity) stated that older traditional technologies like COBOL and Pascal were history. He felt that they should no longer be taught. Even those individuals who recommended that these languages be taught felt that their time was past. They recommended that they be taught as part of general knowledge, to maintain old systems, or to learn some general concepts. This view was countered by Evelyn Timmins, Vice President Texas Commerce Bank, who used the analogy of teaching Latin to learn Spanish. Evelyn feels that to learn Spanish take Spanish not Latin. Analogously, she feels COBOL should no longer be taught.

Based on what I was told and repeatedly observed, I agree that it would be very difficult for a recent graduate to get a job where the primary skill was COBOL, FORTRAN or Pascal. I also agree that these languages should not be part of a curriculum for someone trying to break into the Computer field right out of school. However, I do think they should continue to be offered at Houston Community College as they are useful to current employees at companies that continue to use these languages to support (and sometimes develop) systems. There appear to be a significant number of these employees. Unfortunately for the recent graduate, he or she would find it very difficult to get this kind of job because employee turn over is low in these jobs and internal/experienced people would have the inside track when they do need to be filled. In those cases where these jobs are filled from the outside, a 4 year technical degree is often required.

Elements of some of these languages could be taught to develop more broad based skills in areas such as: program logic, structured programming, modular programming, and data structures.

III. What Is The Solution

There are many opportunities in the Computer field but they require initiative, flexibility and the right technical and nontechnical skills.

The greatest computer jobs require good, up to date personal computer skills. Those skills that are most in demand are:

- Windows
- Word Perfect 5.1
- Word Perfect for Windows
- LOTUS 1-2-3
- Word for Windows
- Excel

Currently, Word Perfect and LOTUS are market leaders but Microsoft's Word and Excel are increasing their penetration with the employers and employment agencies that I spoke with.

According to the January 15 edition of "Datamation," Excel and Word are the best selling software products in the Windows environment. As the Windows environment continues to increase its penetration into the work place, it appears that those two products will penetrate the job market along with Windows.

Computer skills that are in demand but not as universally in demand as the group above are:

- DBase III+
- DBase IV
- DBase Clones (Clipper, Fox Pro)
- Paradox
- Access
- Alpha Four
- Quatro Pro
- Freelance
- Draw Perfect
- Harvard Graphics

People with some or all of the skills in the above 2 groups should be able to find a wide assortment of temporary positions; however, it would be very difficult to obtain a permanent Computer position with just these skills.

Another option for people with these skills is consulting and/or training for multiple employers. Some businesses are just too small to cost justify a full time Computer person.

In order to obtain a permanent Computer position, expertise in a high demand skill or product is generally required in addition to the more general personal computer skills.

The skills/products most in demand were:

- LAN set up, administration, and trouble shooting
- Novell
- Lantastic
- Client/Server development specialists
- Ethernet
- Unix (the demand here is increasing due to the trend toward portability and away from proprietary systems)
- Oracle (there appears to be increased demand for Oracle due to the increased demand for Client/Server and due to Oracle's large market size relative to its competitors.)
- C
- C++ (the interest in C and C++ is also due to portability, in addition C++ takes advantage of recent advances in Object Oriented programming.)
- SQL Relational Databases
- Powerbuilder

Although Lantastic is very popular in peer to peer networks, the introduction of Windows for Work Groups (which is a subset of Windows NT) bears watching as a product that may take over this market. Currently, Windows NT can coexist with client/server products like Novell but cannot coexist with peer to peer products like Lantastic. Windows NT duplicates the functionality of the peer to peer products. One employer, who also required anonymity, was waiting for Windows NT to have the functionality to replace Novell in his company.

Although some employers had some activity in OS/2, CASE (Computer Assisted Software Engineering), and Expert Systems, and Information Engineering there doesn't appear to be a significant job market for these skills in Houston at this time. I recommend that the penetration of these technologies into the market place be monitored periodically. Houston Lighting and Power was a leader in the use of CASE products both Upper (design), lower (code generation) and reengineering (maintenance).

When a preference for a methodology was expressed, it was the top down, structured, modular, attention to detail approach.

The traditional life cycle skills: estimating, designing, programming, testing, and documenting are still needed.
According to the input I received from my advisory board and other employers that I interviewed, hard Computer skills are at most only about half of the skill set that it takes to get a Computer position. The other part of the skill set includes:

- Presenting oneself in a professional manner
- Having realistic expectations
- Knowing about the business in which you want to apply your Computer skills
- Possessing Good English skills
- Possessing Good Math skills
- Being able to manage your time
- Being able to manage multiple projects
- Knowing how to work as part of a team
- Understanding how to present a problem and a recommended solution to management

Bob Frazier, H.L.&P.'s Information Systems Manager, said that he uses the following weighting system when he hires Computer professionals:

- Business Background	25-30%
- Technical Skills	25%
- Teamwork	20%
- Communication skills	20%
- Other	5-10%

Employers are very selective in who they hire in the current job market. They want "hassle free employees." They want employees to dress and behave the way the current employees do. Employers don't want employees who come in with unrealistic expectations and disrupt the work place and then quit after the company has made an investment in them.

Most Computer jobs are in a support function for the Company's business. In some case it is at least as important to understand the Company's business as it is to understand the Company's computing technology. One Computer shop only hired people to serve in its Computer department after they were knowledgeable in at least one of its other departments. Their Management Information Director suggested that someone get a job in one of those departments and then preferably move to a number of other departments before working in the Computer department. Production Operators had Computer employees who knew how to "close the books" and "understood engineering drawings."

Many Computer people work for people who are not Computer people and may not be Computer literate. The computer person's career will be stymied by his or her lack of business knowledge.

Good English skills were required in every Computer shop that I investigated. Among the competencies required were:

- Proper grammar and punctuation
- Being able to read and comprehend technical documents
- Being able to clearly explain a technical concept
- Being cognizant of shades of meaning (eg. "skinny" versus "slender")
- Writing possible solutions to a problem and making a recommendation
- Writing a status report
- Writing succinctly (especially when using electronic mail)
- Documenting a technical piece of work
- Verbally presenting solutions and ideas
- Convincing management and peers that the recommended solution is a good one
- Interviewing
- Customer Relations
- Preventing conflicts

None of the employers (who were all basically involved with Business Computing) required Calculus or other advanced math classes. They did require at least flawless basic math (formulas, percents, fractions etc.) and some required through trigonometry. The over all consensus among Houston employers is that Algebra was needed and generally that was enough math for most business jobs. Employers recognized the good reasoning and logical abilities that math training provides. Bob Frazier liked to see Calculus as it showed the student had mastered a difficult subject, he also liked to see Statistics.

Employees need to manage their time so they can complete their projects on a timely basis. The current competitive business environment and resulting downsizing trend has made it imperative that each employee's productivity be maximized.

Project Management is needed in order to coordinate scarce resources. Currently, most employees work on multiple projects making Project and Time Management that much more important. Employees need to be able to prioritize their tasks.

For most Computer jobs, the day of the programmer going off by himself or herself and building a program is over. Today's Computer professional must learn to work effectively with a variety of people and persoralities. The Computer professional must be able to take constructive criticism and use it to improve his or her work.

The programmer/analyst job is changing from merely building systems to providing whatever computer support his or her customer/business requires. This includes things from checking lose cables, to providing p.c. training, to contributing business ideas to a business problem, to recommending and helping to order hardware and software to the more traditional duties.

IV. Cooperative Opportunities

Several employers expressed an interest in using students in a Cooperative capacity. Some of the thoughts that employers had were:

- the employer would need a useful but not a mission critical task that they wanted completed before hiring a coop.
- the coop. would already have the necessary skills to perform the task
- the employer would want to interview and choose their coop.
- one employer expressed an interest in a detail oriented student to build computer files as part of their system conversion effort.
- a second employer was interested in a coop. to download information from an IBM AS/400 minicomputer to LOTUS. This employer would also like the coop. to provide training.

As major employers have far more job applicants than they need, they expect those who want their time to be as accommodating as possible. They are interested in having the schools provide them with information on the school's Computer program and what it could potentially do for the company on a periodic basis.

The length of time and the types of opportunities available under the Cooperative program vary with the business requirements at the various employers. Both Spring Branch and H.C.C. will have more opportunities if they can be as flexible toward the employers as possible.

My observation is that employers don't have the interest or the resources to research the strengths of the Spring Branch and H.C.C. computer curriculum and computer students. Employers are interested in this information if it is properly presented. I recommend that relationships with employers be cultivated via:

- a newsletter
- periodic (possibly quarterly) phone calls
- semi-annual visits to the employer's facility
- annual tours of the school where the Computer facilities and a portfolio of student work is displayed (possibly at graduation time)

V. Future Opportunities

The preceding report and the other work completed under the Tech. Prep. grant is as accurate as possible; however, it is only accurate for this point in time.

Computer Technologies are constantly changing. A good example is Windows that in short order has come from nowhere to an industry staple. In some cases (and that amount is increasing) Windows is a company standard.

Microsoft has dominated the industry with both DOS and now Windows. Word and Excel continue to penetrate the market at the expense of current market leader Word Perfect and Excel. It is possible that Microsoft's Windows NT (Windows for Work Groups is a subset of Windows NT) will penetrate into Lantastic's market share and may then move on to Novell's market share.

Products like Oracle, Sybase, Powerbuilder and Progress should be continually monitored to determine their penetration into the Houston area market place.

Technologies like Object Oriented, Information Engineering and CASE were not commonly used by most of the companies that I interviewed. However, they were used by some of the more advanced companies. These technologies future use bears watching.

Expert Systems were not used by any of the companies that I interviewed. However, they are used by many companies in other parts of the country. This technology also deserves to be watched.

In summary, the work to date is a good starting point but unless it is periodically updated the information will continually lose its value.

VI. Initiating the Program

To initiate the program the following items need to be addressed:

1. High School students need to be informed about the program that H.C.C.S. is initiating to help them break into the Computer field. They need to know how the program was arrived at, and what opportunities exist for those who complete it. These students need to be actively recruited for the H.C.C.S. Computer Program.

   In particular the Spring Branch students need to know that attending H.C.C.S. will be a natural progression of their current Computer studies. They need to know that articulation agreements will replace any redundancy and they will not be taking "watered down courses."

   Currently, there are few students that go through the entire Computer science program. The current program appears to have some fine classes; however, they don't have enough for a strong curriculum, some of the classes appear to be outdated and they need to be organized to focus on obtaining a job. The current focus is on basic skills and strengthening or adding skills for those already in the Computer field.

2. H.C.C.S. and Spring Branch must maintain and strengthen their existing contacts with employers and continually add to this list of employer contacts. Spring Branch needs to publicize the fine Computer skills that they teach their students, and H.C.C.S. needs to get local employers to buy into the quality of the new Computer Curriculum.

   H.C.C.S. needs to abe as flexible as possible in dealing with local employers. This is especially true until H.C.C.S. Computer graduates have proven to be boons to these companies.

3. New technologies and skills must continually be introduced to the Computer Curriculums as these technologies and skills penetrate the Houston work place.

   A longer term goal is to get ahead of the "power curve" and introduce these new skills into the curriculum just ahead of when the Houston employers will need them.

4. Staff must be identified and recruited to teach these new technologies and skills.

5. Proper equipment must be procured to support the necessary laboratory work.